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THE TRAINING SCHOOL AT VINELAND, NEW JERSEY
DEVOTED TO THE INTERESTS OF THOSE WHOSE MINDS HAVE NOT DEVELOPED NORMALLY

THE TRAINING SCHOOL BULLETIN

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3. Book reviews and news notes.
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DEVELOPMENT OF SOCIAL MATURITY IN FAMILIAL AND NON-FAMILIAL MENTALLY DEFICIENT CHILDREN[1]

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History and Introduction

For many years, the IQ was the principal means of classifying mentally deficient individuals according to intellectual and other psychological capacities. Dissatisfaction with this method of classification developed because it was recognized that the mentally deficient were not to be thought of as a homogeneous group, or subject to classification along only one continuum such as might be measured by an intelligence test. Various studies such as were done on families, e.g., the Jukes and the Kallikaks, revealed the importance of heredity as one major factor in the causation of mental deficiency. Because heredity obviously did not account for all cases, it was logical to think of the mentally deficient as falling into two groups: one due to hereditary causes, and the other due to causes of another type. It was noticed that the two groups were not only different in origin but also in behavior. Terms such as "endogenous", "hereditary", and "primary" are generally representative of one group, while "exogenous", "brain-injured", and "secondary" refer to other cases (1, 2, 4, 7, 9, 10). A reliable system for classification according to this dichotomy has not been available.

Terms such as the above are being used with various conceptions of what they mean. There is no one criterion for each term; rather they are used by different individuals or groups according to criteria of their own choice. Clinical impressions have been important factors in some classification sysems. This resulted in a lack of reliability.

A recent study at the Research Department of The Training School, by French, Cassel, Arbitman and Weissenberg, entitled, "*A System for Classifying the Mentally Deficient on the Basis of Anamnesis.*" (5) attacked this problem of reliability of classification. A system was devised for differentiating two types of the mentally deficient according to: 1) Educational level of the parents, 2) Presence or absence of

1. Submitted to the Department of Psychology of MacMurray College for Women in partial fulfillment of the requirements for the degree of Master of Arts. The writer is grateful for the guidance and assistance of Dr. Karl F. Heiser and Staff of the Research Department of The Training School at Vineland, New Jersey.

mental deficiency in the immediate family, 3) Parental occupational level, and 4) Presence or absence of a "possible cause" (e.g., birth injury) of acquired mental deficiency in the subject. The material for the identification or measurement of the above four criteria was taken from the case histories, thereby omitting the possibility of clinical impression influencing the diagnosis.[1] The terms familial and non-familial were chosen to designate the two groups. They were meant as descriptive terms only, and did not imply any genetic or sociological theory of etiology.

The authors reported that there was substantially more reliability with this method of classification just cited, than any previous system. Three studies were conducted by the authors to test its usefulness and applicability. These were with the Heath Rail-Walking Test, the Cassel Modification of the Witmer Formboard Test and the Ellis Designs Test (5, p. 34). The results of these three studies showed that the difference between the familial and non-familial groups were significant in each of the three tests mentioned.

Problem

The present study was undertaken as a further step in testing the significance of the "familial, non-familial" classification system. Specifically, the problem was to find out if there is a difference in the rate of maturation of social competence between children who may be classified in the familial and non-familial categories. Such a study is thought to have both theoretical and practical significance. On the one hand, differences in social competence between these two groups might increase the understanding of etiology, and on the other, such differences might give indication of the desirability of special methods and precautions in the home and school training programs for these children.

Hypothesis I—*The non-familial mentally defective child develops social competence or social maturity at a slower rate than the familial child.* It is assumed that the organic pathology of the brain or nervous system, which is presumably present in the non-familial cases, offers specific limitations or obstacles to the development of social competence. The "familial" children, however, are expected to develop social maturity both more rapidly and more evenly; i.e., the different aspects of social maturity should develop at a similar rate.

1. For a complete discussion of the bases upon which these criteria were established, the reader is referred to pages 14 to 25 of the original monograph.

Hypothesis II—*The difference between familial and non-familial children in rate of social growth is reflected chiefly in the area of self-management in free, unsupervised situations.* More specifically, the non-familial child shows less competence in going around without supervision. The supposed brain damage of the non-familial group would affect their development mainly in this area, because coordination, memory, attention, judgment and reasoning are most often affected (8).

Procedure and Results

As a method of comparing the social competence of the two groups of children, it was decided to use the Vineland Social Maturity Scale (3). From the files of those children who classified as familial or non-familial, according to the study discussed above, 31 familial and 31 non-familial children were matched in pairs on the basis of chronological and mental age at the time they were measured with the Vineland Social Maturity Scale. All 62 of these children were male; they were between nine and eighteen years of age: their mental ages were above four years and their I. Q.s were below 80. These data for each child are shown in Table I.

The length of residence in The Training School for these children varied around means of 4.5 years and 3.4 years for the familial and non-familial children, respectively.

The Vineland Social Maturity Scale consists of 117 items, each of which is scored plus or minus by the psychologist on the basis of information furnished by one who is in everyday contact with the child. The items are scaled into age levels and the total number of passed items is converted to a social age. A social quotient, S. Q., is derived in the manner of the Binet I. Q.

The 117 questions are classified according to the normal age-levels at which they are passed and are further subdivided according to one of eight aspects of social maturity which are thought to be of significance. These eight areas are: Self-Help, General; Self-Help, Dressing; Self-Help, Eating; Self Direction; Communication; Socialization; Locomotion; and Occupation. The specific behaviors covered by these areas are illustrated by the following items quoted from the scale:

1. Self-Help General.
   a. Cares for self at toilet. (Year 4 to 5)
   b. Tells time to quarter hour. (Year 7 to 8)

2. Self-Help Dressing.
   a. Bathes self assisted. (Year 6 to 7)
   b. Exercises complete care of dress. (Year 12 to 15)
3. Self-Help Eating.
   a. Eats with fork. (Year 2 to 3)
   b. Uses table knife for cutting. (Year 7 to 8)
4. Self-Direction.
   a. Is trusted with money. (Year 5 to 6)
   b. Buys own clothing accessories. (Year 12 to 15)
5. Communication.
   a. Prints simple words. (Year 5 to 6)
   b. Reads on own initiative. (Year 8 to 9)
6. Socialization.
   a. Plays competitive exercise games. (Year 4 to 5)
   b. Engages in adolescent group activities. (Year 12 to 15)
7. Locomotion.
   a. Goes to school unattended. (Year 5 to 6)
   b. Goes about home town freely. (Year 9 to 10)
8. Occupation.
   a. Uses tools and utensils. (Year 8 to 9)
   b. Does small remunerative work. (Year 10 to 11)

Each subject was given an appropriate age-level score for his achievement in each sub-score area.

Table II indicates the gross differences in social maturity between the familial and non-familial children. By the method of the "t" test, it was found that the difference between the mean social ages of the two groups is significant at the 2% level of confidence and that the difference between the mean social quotients of the two groups is significant at the 4% level of confidence.[2]

Hypothesis II was tested in the following manner:

1. Each subject was assigned a year-level score for each sub-area. The year-level score is the year-level of the highest pass in a sub-area.

2. The year-level scores for all subjects were combined into a single distribution for each sub-area. On each distribution, a point was chosen which most nearly divided the total group into two equal parts, but which permitted all subjects with the same score to

2. The "t" test and "level of confidence" are statistical methods used for judging the significance of the results.

TABLE I

Distributions of Measures of Chronological and Mental Ages in Years for 31 Pairs of Familial and Non-Familial Mentally Deficient Children

Pair No.	Chronological Age		Mental Age	
	Fam.	Non-Fam.	Fam.	Non-Fam.
1.	18.8	18.5	9.9	9.8
2.	18.7	18.9	6.3	6.3
3.	18.4	18.8	4.8	4.8
4.	18.1	17.7	7.2	7.2
5.	17.6	18.2	9.6	9.7
6.	17.5	17.7	10.5	10.7
7.	17.3	17.2	9.0	8.8
8.	16.7	16.8	9.2	9.1
9.	16.5	17.0	6.8	6.8
10.	16.5	15.9	7.6	7.5
11.	16.2	16.1	10.6	10.8
12.	16.2	15.4	6.7	6.8
13.	16.1	16.3	8.5	8.3
14.	15.8	16.1	7.3	7.3
15.	15.7	16.2	5.5	5.5
16.	15.5	15.3	9.3	9.2
17.	15.2	14.8	6.2	6.2
18.	15.1	15.1	10.5	10.3
19.	14.9	15.8	6.0	6.0
20.	14.5	15.2	6.7	6.8
21.	14.3	14.8	6.3	6.3
22.	13.8	14.1	6.7	6.5
23.	13.7	13.4	5.8	5.8
24.	13.5	14.3	6.9	7.0
25.	13.4	13.8	7.0	7.0
26.	13.0	12.6	7.2	7.0
27.	12.3	11.1	5.5	5.5
28.	11.5	11.3	7.2	7.5
29.	10.5	10.3	7.0	7.0
30.	9.8	9.0	5.3	5.2
31.	9.5	9.4	5.0	4.9
Mean	15.05	15.07	7.36	7.35

TABLE II

Comparison of Means of Social Ages and Social Quotients for 31 Pairs of Familial and Non-Familial Mentally Deficient Children Matched for Chronological Age and Mental Age

	Social Age	Social Quotient
Familial	8.75	.60
Non-familial	7.95	.54
Mean difference	.80	.06
t (for correlated means)	2.52	2.24
P	0.02	0.04

be in the same position relative to that point; i.e., all subjects with a given score would be above or below this point. See Table III. It can be seen that this point might deviate considerably from the median.

3. In the familial and in the non-familial groups, the proportion of subjects above the cutting point in each sub-area was determined. A test for the significance of the difference between these two proportions was conducted for each sub-area. A critical ratio for correlated proportion was used (6). The distribution of critical ratios appears in Table IV. It will be noted that the inferiority of the non-familial children in the area of 'Locomotion' supports hypothesis II.

Discussion

The results of this study are of two-fold value. First, it gives further evidence of the merit of the familial, non-familial classification system by showing that it differentiates the two groups in the area of social competence. A classification system which differentiates between groups on only a few tests would be of little value to the psycholoigst working with the mentally deficient. What is needed is a system that is not only reliable, as this has been proved to be, but which is pertinent to different areas of behavior in every-day life. The present results place this classification system one step nearer to that goal.

Of more importance to those working with the mentally deficient is the difference found by the present study between the familial and non-familial groups. The fact that the non-familial children develop social competence at a slower rate than the familial, calls attention to the effect of specific deficits in intellectual capacity on social ability. This has significance in the field of education of the mentally deficient. It has been recognized that because of these specific deficiencies of the non-familial, they may need special methods for teaching in academic subjects (8). This need is now indicated in their every-day social adjustments. As they are slower to develop socially than the familial, especially in certain areas, we can not expect them to maintain the same level as the familial. This means that if we force them to compete with the familial mentally deficient child, further frustrations resulting in severe emotional problems may develop. The non-familial child frequently comes from a family where, because of the generally higher socio-economic level, greater pressures have been exerted for achievement. Such pressures tend, inevitably, to cause certain emotional ten-

TABLE III

Year-Level Scores Above and Below the Cutting Points for Each Sub-area of the Vineland Social Maturity Scale

Area	Self-Help General	Self-Help Dressing	Self-Help Eating	Self Direction	Communication	Socialization	Locomotion	Occupation
Above	8 & * over	9 & over	10	6 & over	7 & over	8 & over	7 & over	9 & over
Below	5 & * under	8 & under	8 & under	0	6 & under	7 & under	6 & under	8 & under

* The omission of scores between 5 and 8 is necessitated by the lack of such scores on the sub-area. Whenever gaps between "Above" and "Below" scores appear in this table, there are such gaps in the sub-areas.

TABLE IV

Comparison of Performances of Familial and Non-Familial Members of 31 Matched Pairs of Mentally Deficient Children on the Eight Sub-areas of the Vineland Social Maturity Scale

Sub-Area	Self-Help General	Self-Help Dressing	Self-Help Eating	Self Direction	Communication	Socialization	Locomotion	Occupation
C.R. (for correlated proportion)	2.53	1.67	2.24	0.00	1.51	0.83	2.67	1.39
P	0.01	0.10	0.02*	—	0.13	0.41	0.01	0.16
Better Performance by:	Non-Fam.	Fam.	Fam.	—	Non-Fam.	Fam.	Fam.	Fam.

* Although all results should be interpreted with caution because of the low frequencies in the 2-way cells, this value should be considered as being even more tentative than the others.

sions. Therefore it is particularly important, when such children are placed in a special school to further their training, that they not be subjected to continuing pressures for achievement in areas of special handicap. Specifically, the fact that inability to function without supervision is the main cause for this slower rate of development again emphasizes the relationship between intellectual handicap and social competence. It has already been shown (8) that coordination, memory, concentration and the ability to assimilate facts into a complete concept are the functions most often affected by injury to the brain. These functions are fundamental to the social ability mentioned above. A non-familial mentally deficient child seems, then, to be less capable of making decisions by himself; cannot remember what he was supposed to do and he can not assimilate separate parts and put them together so that he can handle them alone. This not only implies that he be taught academic subjects part by part until he has the whole concept, but he needs also to be taught by the same part by part method, for example, how to go around his home town, watching street lights, finding his way and remembering why he went to town, without getting confused.

It is interesting to note (See Table IV) that there is a tendency for the familial mentally defective child to have a higher level of achievement than the non-familial in the area of Self-Help, Eating. Due to the small number of cases this statistical indication of the tendency should be accepted only tentatively. This difference may be due to poorer coordination, and if, at a future date, this is found to be a really significant difference it will again call attention to the effect of brain damage on even the simple task of taking care of one's self at the table.

Summary

The present study was conducted to test the hypothesis that non-familial mentally deficient children develop in social maturity at a slower rate than do familial defectives. A further hypothesis was tested, i.e., that the difference in social maturity between the two groups of children is due largely to the inferiority of the non-familial children in the area of self-supervision under free or unstructured situations (what might be called "going around on one's own").

In terms of the Vineland Social Maturity Scale, which was used to test these hypotheses, the non-familial children were predicted to

have lower social ages and social quotients and they were predicted to have a significantly lower score in the area of the scale called "Locomotion".

The records of 31 familial children were compared with those of 31 non-familial children with whom they were paired for chronological and mental ages. The results were as follows:

1. The non-familial children were lower than the familial children in:

   a) Social age. $t=2.52$, $P=0.02$

   b) Social quotient. $t=2.24$, $P=0.04$

2. This inferiority of the non-familial children was found to be due chiefly to the fact that they were lower than familial children in the specific area of the Vineland Social Maturity Scale which is called "Locomotion" (C. R. for correlated proportion $=2.67$, $P=0.01$).

3. In the area called "Self-Help, General", the non-familial children tended to be at a higher level of social development than the familial children (C. R. for correlated proportion $=2.53$. $P=0.01$). This area is concerned with such tasks as taking care of one's self at the toilet and telling time to the quarter hour.

The implications of these results for home and school training of defective children have been discussed.

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TRAINING SCHOOL TESTS TO BE TRANSLATED INTO "AFRIKAANS"

Social maturity tests developed at The Training School will be translated this year into a strange and little-known tongue, according to Dr. Walter Jacob, director of the school. The language is called "Afrikaans" and is used by some of the natives and 60 per cent of the Europeans living in the Union of South Africa.

Two British study visitors, at The Training School in December, told Dr. Jacob of the forthcoming translation. They were: Dr. Lewis A. Hurst, physician-superintendent of the Alexandra Institution at Maitland, Cape Town where more than 1,000 mentally retarded persons from the European population are enrolled; and Dr. C. H. De C. Murray, vice-principal of psychological services in a new school for handicapped boys at Kimberley, South Africa.

Both men had been long familiar with the research work at The Training School here, stating that the Porteus maze tests and the Vineland Social Maturity Scale, developed by Dr. Edgar A. Doll, are used widely in South Africa. At the American Psychological Association convention held this fall in Chicago, the two men met and talked with Dr. Stanley A. Porteus and Dr. Doll, both of whom are former research directors of The Training School.

Dr. Hurst is in the United States on a World Health Organization fellowship and is working with the New York Psychiatric Institute in New York City.

Dr. Murray came to America, his first trip, on a fellowship from the Commonwealth Fund through which many British scientists and educators come to the United States each year.

Asked about their impressions of America during these first weeks of their visit, Dr. Hurst and Dr. Murray paid high tribute to the reception they had received here.

"Nobody could help being impressed," Dr. Hurst said, "with the wide diversity of American culture and the many facets of educational interests here. I'm constantly amazed at the number of people who give long hours of their personal time to discuss our problems with us. You can't know how valuable such free interchange of information is to us."

THE PRESENT STATUS OF GLUTAMIC ACID THERAPY FOR MENTAL DEFICIENCY

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The social waste and personal tragedies produced by mental deficiency have caused both scientists and laymen to seek preventive means or cures for the condition. Our great need sometimes makes us anxious to accept any cure which is offered, because we hope so strongly that the cure will be effective. We are sometimes more concerned with having a cure "work" than with understanding how it is, or how it might be, effective.

In the minds of laymen and professional specialists other than psychologists and educators, mental deficiency has been thought of as a lack of intelligence, while intelligence itself has been considered synonymous with I. Q. (an intelligence quotient found through the use of certain standardized psychological tests.) Thus anything which seemed to raise the I. Q. was immediately seen as a potential specific treatment for mental deficiency. Such thinking is essentially naive, for it reveals a lack of understanding of the nature of mental deficiency and of intellectual functioning in general.

People concerned with the problems of mental deficiency (parents, administrators, educators or psychologists) have heard a great deal about the treatment of mental deficiency with glutamic acid. This article is an attempt to survey the literature on glutamic acid treatment, and to bring the readers of *The Training School Bulletin* up to date on the present state of knowledge about this important problem.

Although experiments done on glutamic acid had come to the attention of professional men as early as 1943, it was not until the appearance of Bliven's article (5) in the December, 1947, *Ladies' Home Journal* that such experiments came to the attention of the general public. Since 1947, many other articles on glutamic acid have appeared in popular magazines and in professional journals. In all, from 1943

to the present, forty-four articles concerning glutamic acid have appeared in popular and scientific publications.

According to these articles, glutamic acid was first used in order to reduce the number of seizures in epileptic patients. It was noticed that these patients, after the administration of glutamic acid, became more alert and seemed more intelligent. Experiments were then performed on mentally deficient individuals in the expectation that they, too, would become more alert and more intelligent. In the course of these experiments it was found that glutamic acid worked best with children who were mentally deficient without gross brain damage. On the other hand, it did not seem to be as effective with individuals who were seriously brain-injured as well as mentally deficient. It was also found that the efficacy of glutamic acid treatment seemed to be less in the presence of behavior problems.

With mentally-deficient children who were not seriously brain-injured and who had no marked behavior problems, several investigators reported glutamic acid to be beneficial. They found that in some cases, under glutamic acid, there were increases of twenty to thirty points in I. Q.; in other cases the gain was not as substantial but was still large. They also found an improvement in the general attitude of the patients; they were more tractable, less unstable emotionally, and seemed more alert. With children classified as "dull normal" or "borderline mentally-deficient" on the basis of I. Q., these investigators reported that under glutamic acid the I. Q. was advanced into the normal range of 90 or more. Glutamic acid was also thought to be effective with mongoloid mentally-deficient children; it sometimes even brought about a qualitative change in the mongoloid child's physical appearance. In most cases, regardless of the type of mental deficiency exhibited, the maximum benefit from glutamic acid was derived in from six months to a year following initiation of treatment.

It is important to note, however, that after a while other experimenters reported finding that glutamic acid was not as effective as they had expected it would be. In some instances they found no change in intelligence quotient under glutamic acid, while in other instances they found an increase which was too small to be of importance.

Perhaps the most striking feature of this literature on glutamic acid, at least as far as the parent of the mentally-deficient child is

concerned, was that some articles reported positive results with mentally-deficient children under glutamic acid and others reported negative results. Parents who saw, at first, the possibility of a "cure" for their children through the use of glutamic acid were confused with the appearance of each additional popular article on the subject. One article would hold forth the hope that glutamic acid would be a "miracle drug" for mental deficiency, while another would report that the administration of glutamic acid caused no increase in intelligence quotient.

As Ginsburg stated in 1950 (12), "For each of these positive investigations another could be cited in which no beneficial effects of glutamic acid were found under presumably similar experimental conditions . . . The literature on this subject confronts the investigator at one and the same time with theoretical interpretations of facts . . . and with negative data, which make it seem that the facts requiring such interpretation do not exist."

These seemingly contradictory articles, together with some physicians' reluctance to place children under glutamic acid treatment, caused a great deal of anxiety in the minds of parents of mentally-deficient children.

The purpose of this present article is to mention some of the different results reported in different investigations, to show some of the reasons for disparity in results reported, and to try to answer the question which so many parents of mentally-deficient children ask: "Shall I ask my physician to place my child under glutamic acid therapy?"

The following two instances are typical of the contradictory results which have been reported and which have confused parents of mentally-deficient children:

(1) In July, 1949, *Science Digest*, a popular magazine, reported that "Glutamic acid, which aroused wide interest some time ago as a possible means of stimulating mental activity, has been tried on a group of feebleminded persons and found to have no apparent effect, says Dr. Harold G. Loeb" (44). Yet, just a few months later, in October, 1949, in the same magazine, *Science Digest*, the following statement appeared concerning glutamic acid: "Encouraging evidence that children born with mongolism . . . may no longer be doomed to idiocy or imbecility is reported by researchers" (42).

(2) Even more recently, in October, 1950, L. M. Miller in the *Reader's Digest* stated, ". . . scientists have found a 'brain food' that already is doing an awe-inspiring job. . . . doctors still speak guardedly of its effects. Yet the promise of glutamic acid is enormous for children who are backward in school, deficient mentally, or who belong to that sheltered class of defectives called 'mongols'" (21). But in *Science Newsletter*, six months later, in April, 1951, there was a statement that "Hope that doses of glutamic acid would raise the intelligence level of mental defectives was dimmed by a report by Drs. Ralph N. Zabarenko and Guinevere S. Chambers of the Western Psychiatric Institute and Clinic, Pittsburgh, to the Eastern Psychological Association, Brooklyn, New York" (43).

It should be noted that the same confusion exists in professional journals and in popular magazines regarding the efficacy of glutamic acid.

The following table lists the articles concerning glutamic acid which have appeared in scientific journals and in popular magazines together with the date on which they appeared, and whether they showed positive, negative or inconclusive results.

Several authors, including Ellson, Fuller and Urmstrom (8), have shown the presence of uncontrolled factors or of poor experimental techniques in some of the studies, particularly those which appeared prior to 1950. It may be easier for parents of mentally-deficient children, and others concerned with their welfare and care, to understand some of the conflicting evidence presented in the literature on glutamic acid therapy if some of these uncontrolled factors or poor experimental procedures are discussed:

I. *Concerning The Type of Subject Used*:

A. Recent work by Doll (7) shows the importance of considering whether the mental deficiency in a particular case is due to exogenous (brain-injury) factors or endogenous (familial) factors. Doll's findings have important implications regarding the efficacy of glutamic acid therapy for children on the basis of whether their mental deficiency is exogenous or endogenous in nature or cause. For this reason subjects in glutamic acid experiments should have been divided into exogenous and endogenous (or brain-injured and not brain-in-

TABLE I

ARTICLES CONCERNING EFFECT OF GLUTAMIC ACID

Investigator or publication	Date	*Findings	Bibliography (See Pp. 198-199)
Using Animal Subjects			
Albert & Warden	1944	+	2
Zimmerman & Ross	1944	+	38
Hamilton & Maher	1947	—	13
Stellar	1948	—	25
Stellar & McElroy	1948	—	26
Marx	1948	—	18
Marx	1949	—	19
Porter & Griffin	1950	+	22
Ginsburg & Others	1950	0	12
Using Human Subjects			
Price, Waelsch & Putnam	1943	+	23
Albert, Hoch & Waelsch	1946	+	1
Zimmerman, Burgemeister & Putnam	1946	+	33
Bliven	1947	+	4
Science Newsletter	1947	+	45
Time Magazine	1947	+	40
Bliven	1947	+	5
Hoch	1947	+	14
Bakwin	1947	+	3
Zimmerman, Burgemeister & Putnam	1947	+	34
Hygeia Magazine	1948	0	39
Waelsch	1948	+	27
Science Digest	1948	—	41
Zimmerman, Burgemeister & Putnam	1948	+	35
Gasorek	1948	+	10
Levine	1949	+	16
Science Digest	1949	—	44
Zimmerman	1949	+	29
Science Digest	1949	+	42
Zimmerman, Burgemeister & Putnam	1949	+	36
Zimmerman, Burgemeister & Putnam	1949	+	37
Ernsting	1949	—	9
Waelsch	1949	+	28
Gilbert	1949	+	11
Maureen	1949	+	20
Quinn & Durling	1950	+	24
Zimmerman & Burgemeister	1950	+	30
Zimmerman & Burgemeister	1950	+	31
McCulloch	1950	—	17
Ellson, Fuller & Urmstron	1950	—	8
Miller	1950	+	21
de la Fuente Muniz	1950	+	6
Science Newsletter	1951	—	43
Kantor & Boyes	1951	—	15
Zimmerman & Burgemeister	1951	+	32

* + article reported a study (or studies) which found a significant increase in the intelligence of the subjects as a result of glutamic acid treatment.

– article reported a study (or studies) which found no significant increase in the intelligence of the subjects as a result of glutamic acid treatment.

0 article reported a study (or studies) which found inconclusive results concerning an increase in the intelligence of the subjects as a result of glutamic acid treatment.

jured) groups. Most articles reporting results with glutamic acid therapy have not divided their subjects into these groups; hence, we might expect that a group of subjects who are predominantly exogenous would give different results after therapy than a group of subjects who are predominantly non-brain-injured. As mentioned earlier, experimenters, such as Zimmerman (29), find that the presence of brain damage decreases the efficacy of glutamic acid therapy; this is all the more reason for separating subjects into groups according to the cause of their mental deficiency.

B. Most reports have not specified the grades of subjects used, or have used different grades of subjects in the same study, and have reported the results without separating the subjects. Occasionally studies have been done using mentally-deficient and non-mentally-deficient subjects in the same study, without separating the obtained data into two corresponding groups. In other cases, one study has used mentally-deficient subjects and another study has used non-mentally-deficient subjects; a comparison of results obtained in two such studies cannot be very meaningful. There is difficulty even in comparing two different studies where both studies used mentally-deficient children, if they do not state their criteria for mental deficiency. This, unfortunately, is frequently the case. If different studies used different criteria for mental deficiency, it would be erroneous to compare them directly, on the assumption that the two groups of subjects used in the two studies are similar.

II. *Use of Controls*:

Essentially, the problem involved here is as follows: Let us assume that there are three similar groups of subjects in an experiment —group A, group B and group C. We put the members of all three groups on glutamic acid therapy, and at the end of a specified time we see that the I. Q.'s of the members of the groups have increased. How much of this increase is due to glutamic acid, and how much of this increase would have occurred if we had just left these individuals alone and not given them glutamic acid? Or, if we had given them harmless pills containing sugar, which they thought were some sort of *bona fide* pills containing medicine, how much of an increase would there be in their responses to intelligence tests over a specified time?

To answer these questions, the following procedure is sometimes used: (1) Groups A, B, and C are selected so they are similar with regard to mental age, chronological age, sex, etc. (2) The intelligence of each child is tested without the examiner knowing to which group the child belongs. (3) Group A is given glutamic acid, group B is given a sugar pill (placebo) which tastes like glutamic acid, and group C is given no pills. (4) At the end of a specified time, the intelligence of the children is tested again, without the examiner knowing to which group each child belongs. From a comparison of the gains, or lack of gains, in the three groups, one can make a reasonable estimate of the amount of gain which is due to the administration of glutamic acid itself, and which is not due merely to the passing of time or to the fact that the individuals know they are receiving some sort of medication.

Several studies using glutamic acid have not made use of such controls, either through the method explained above, or through any other of the recognized methods for establishing controls. In such articles it is not possible to make an accurate estimate of the amount of change in intelligence which is due solely to glutamic acid therapy.

As regards the use of controls in studies on glutamic acid, the following additional points may be of interest:

A. An attempt should be made to assess the effect of the extra attention given the children coincident with receiving glutamic acid. This attention may produce a change in intelligence test performance. As Ellson, Fuller and Urmstron (8) point out, this may be a very important factor in explaining the results of the experiment.

B. The examiner should not know whether the children he is testing belong to the experimental group (given glutamic acid) or to the control group (given a sugar pill or given no medication). Ellson, Fuller and Urmstron (8), and McCulloch (17) all make this comment. Particularly on the Stanford-Binet Intelligence Test, where some items are scored rather subjectively, it is necessary that this precaution be taken.

C. The effects of a generally-stimulating drug, such as thyroid extract or benzedrine sulfate, on intelligence, should be tested in an experiment which will also make use of a control group which is receiving glutamic acid. Perhaps the thyroid, benzedrine or similar

stimulating drug would raise the mental level of children as high as glutamic acid would raise it, or even higher. No studies heretofore have taken this factor into account.

D. The factor of an inadequate general diet should be controlled. Marx (18, 19) found this to be important in his work with animals. It is possible that in some of the studies done on children, the children were on a generally inadequate diet. In some cases, then, the addition of huge amounts of glutamic acid to these diets could bring about an increase in intelligence as a function of a healthier, more active organism rather than as a function of glutamic acid itself. In those studies where glutamic acid added in large amounts to the diet did not affect intelligence levels, it is possible that the general nutritional level was adequate; hence adding glutamic acid to the diet had no effect. From the data reported, there is no way of comparing diets of different experimental groups for degree of adequacy.

III. *Presentation of Results*:

There are several factors concerned with the presentation of the results obtained in an experiment, which may be important in understanding some of the reasons for two different studies of the same problem presenting seemingly conflicting results:

A. Most reports concerned with the efficacy of glutamic acid present their results in terms of whether the numerical changes in intelligence test scores following glutamic acid therapy are statistically significant. However, the criteria for statistical significance vary from one article to another. Obviously it is difficult to compare results reported from two studies if the reports are using different criteria for statistical significance. It would seem to be necessary for workers in this field to agree among themselves on some criteria for statistical significance and then to base their conclusions upon them.

B. Most studies test the intelligence of the subjects twice: once immediately before the administration of glutamic acid, and once when the administration of glutamic acid has ceased. This practice may itself be responsible for the conflicting results presented. Let us say that the majority of the children in a group A have an intelligence pattern characterized by a steady, small increase in intelligence (men-

tal age) each year. Let us say that the majority of the children in another group, group B, have an intelligence pattern where they do not gain in mental age steadily year by year, but advance in irregular spurts. A study using group A would find an increase in intelligence at the end of the glutamic acid therapy. Yet, this increase might not be due to glutamic acid. Because the intelligence of the subjects was not measured for a long enough period of time before they received glutamic acid therapy, the steady normal rise in intelligence would not be apparent. If the children in group B showed no gain in intelligence under glutamic acid therapy, this lack of increase could not be attributed to the failure of glutamic acid to raise intelligence quotients. It is necessary that intelligence test records be obtained on children for a considerable time prior to their being given glutamic acid, in order to plot their pattern of growth of intelligence independent of the possible effects of the specific treatment.

C. The increases in intelligence found following the administration of glutamic acid, where such increases occur, should be evaluated clinically as well as statistically. For example, it is possible, under certain conditions, that a rise in I. Q. from 60 to 65 over a period of time will be statistically significant. However, behaviorally, for all practical purposes, the intelligence of the child is unchanged; he may not learn more rapidly, he may not remember items for longer periods of time than before, he may require the same social supervision, and so on. Many of the previous experiments reporting statistically significant positive gains in intelligence under glutamic acid therapy have presented gains which do not appear to be clinically significant. For all practical purposes, even though the I. Q. was raised by glutamic acid, the true criteria of increased mental functioning are not represented by the I. Q. alone. One must be concerned primarily with the actual behavioral picture as a whole.

D. Several studies have used an anecdotal, story-telling method for presenting their results. One article may use rigid statistical criteria for showing increased intelligence quotients; another article may use statements such as the following, which were used by Quinn and Durling (24) to indicate the degree of improvement of mental functioning under glutamic acid: " 'She has settled down to work instead of fooling as she did in the past' " and " 'He never goes on a

bat any more and he works steadily.'" Obviously one article, using the more rigid criteria for evaluating success under glutamic acid therapy, and this type of article indicate different types of improvement under glutamic acid therapy. While such behavioral changes are of significance, it must be shown that they are due to glutamic acid rather than to other influences.

IV. *Special Problems*:

A. Additional experiments on animals are necessary in order to see whether it is possible to achieve more consistent results than have been achieved to date. Some of the studies have found that glutamic acid helps animals to learn, and other reports indicate that it does not. If most experiments gave the same essential results, they would have an important bearing on the question of the possible effectiveness of glutamic acid with mentally-deficient children.

B. An attempt should be made to assess the dangers involved in the long-term use of glutamic acid with children. At present there is little information regarding the possibility that large doses of glutamic acid, over a long period of time, damage the internal organs, the brain and the spinal cord. There is already evidence that such doses of glutamic acid as are now given to children can cause extreme irritability and gastro-intestinal upsets. As a matter of fact, in deciding what dosage to give to a child, the physician gives increased dosages until such upsets occur, and then he lowers the dosage to a point just below that where they cause upsets. The effect of such a drug on the gastro-intestinal system or the central nervous system may be harmful. More light might be thrown on this problem by giving animals large doses of glutamic acid over a long period of time, sacrificing them and then examining their internal organs and central nervous system for signs of damage.

Summary

A number of articles concerning the use of glutamic acid with mentally-deficient children have appeared since 1943. Some of these articles have presented evidence of an increased mental functioning due to glutamic acid treatment, while others have reported no appreciable improvement. This collection of articles, offering both positive and

negative results, is confusing, especially to the layman. Parents of mentally-deficient children, in particular, have thought that glutamic acid therapy promised a cure. Many of them, confused by the picture described above, have either refused to give glutamic acid to their children, or else have asked various agencies for help in evaluating the efficacy of glutamic acid on mental deficiency.

Many of the experiments so far published have neglected to take into account some particular scientific precautions, or have not clearly described the study and thus have made it impossible to compare the results with those from another similar study. In the light of this situation, it may be said that there is no conclusive evidence that glutamic acid itself is a specific drug which can raise the level of mental functioning of defective children. Its harmlessness to the internal organs and to the central nervous system when it is administered in large doses over long periods of time has not yet been proved.

It seems quite clear that glutamic acid may so stimulate activity in children as to result in slightly higher I. Q.'s. It is not known whether these gains will be large enough to be clinically and behaviorally significant. Furthermore it is possible that glutamic acid may be effective with only some of the types of mental deficiency, or with only certain children under certain specified conditions.

Glutamic acid burst into print as a remedy which was not yet, at that time in 1947, sufficiently tested. Many parents who hastened to place their children under such therapy have been disappointed with the results; however, it must be stated that other parents have been pleased with results. In recent years the trend shown in the scientific literature dealing with the effects of glutamic acid has been to indicate that it does not appreciably raise the level of mental functioning.

Only when definitive experiments, which take into account all the precautions necessary in psychological research, show positive effects of glutamic acid on intelligence, and only when glutamic acid is found to be harmless in large doses over a long period of time, will it be safe, advisable and beneficial to place children under such medication.

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PARENTS ASSOCIATION SPONSORS DINNER AT WALDORF-ASTORIA

For the benefit of the children in The Training School at Vineland, announcement has been made of a "Give-or-Get" dinner and dance to be held at the Waldorf-Astoria hotel in New York on Saturday evening, May 10, 1952.

The event is sponsored by the Parents Association of the school and Pearl S. Buck has assumed responsibility for procuring prominent personalities from the entertainment world to participate in the program. Dr. Walter Jacob, director of the school, Guy P. Bible, president of the board of trustees, and Morris Feld, president of the parents' group, are already working on plans for the event.

The dinner will culminate months of endeavor to add substantially to the "For Happiness" Fund for the children enrolled at the school, which is a private, non-profit institution. The school receives no financial support from the state except payment for the wards of the state who are placed here. There are 550 children in the school, which was established in 1888, and more than half of these are state charges.

The funds raised prior to the dinner will not be applied to the general operating expenses of the school but will be used for health and recreational equipment; improvement of cottage day rooms, school rooms, and assembly halls; adding to the building fund for a proposed canteen for the children; and for special research projects in child development.

Anyone who gives or gets (by earning) $50 receives a free ticket to the dinner, dance, and entertainment. Many of the parents have already started on individual projects—selling greeting cards, selling hand-painted trays which they have painted themselves, sponsoring card parties, movie or theatre benefits, or working through their clubs to stage gift bazaars, bake sales, and so forth.

It is expected that at least 400 guests will attend the dinner which will be held in the Sert Room of the Waldorf-Astoria. Dancing will follow the dinner. Dress will be optional. Richard E. Thomson of 375 Mt. Prospect Ave., Newark 4, New Jersey has been named chairman of the dinner committee.